

2009

## Visual versus auditory learning and memory recall performance on short-term versus long-term tests

Katie Lindner  
*Milligan College*

Greta Blosser  
*Milligan College*

Kris Cunigan  
*Milligan College*

Follow this and additional works at: <https://scholar.utc.edu/mps>



Part of the [Psychology Commons](#)

---

### Recommended Citation

Lindner, Katie; Blosser, Greta; and Cunigan, Kris (2009) "Visual versus auditory learning and memory recall performance on short-term versus long-term tests," *Modern Psychological Studies*: Vol. 15 : No. 1 , Article 6.

Available at: <https://scholar.utc.edu/mps/vol15/iss1/6>

This articles is brought to you for free and open access by the Journals, Magazines, and Newsletters at UTC Scholar. It has been accepted for inclusion in Modern Psychological Studies by an authorized editor of UTC Scholar. For more information, please contact [scholar@utc.edu](mailto:scholar@utc.edu).

Katie Lindner, Greta  
Blosser,  
&  
Kris Cunigan  
Milligan College

## **Visual versus Auditory Learning and Memory Recall Performance on Short-Term versus Long- Term Tests**

Our study explored the influence of visual versus auditory learning on recall of a memory test. There were four groups in our study, two of which heard an article, and two of which read an article. All groups were then given a posttest to assess their recall. Two of the four groups took an immediate posttest, and the other two took a delayed posttest 45 minutes after hearing or reading the article. Visual learning outperformed auditory learning in both the immediate post-test condition, as well as in the delayed post-test condition. Overall, our study found that visual learning produced better recall than auditory learning.

The topic of memory recall has been the subject of much research. Research Investigations have involved short and long term memory as well as various mediums, such as auditory, visual, and visuospatial. Pickering, Peaker, and Gathercole (1998) designed and conducted an experiment which studied whether the same memory process was implemented in the recall of verbal and visuospatial information. The 59 participants were five and eight year old children tested in a quiet room of their local public school. For the verbal group, the experimenter read a list of consonants to a child and then asked the child to repeat the letters in the correct order. Similarly, the children in the visuospatial group watched an experimenter make a series of taps on a set of wooden blocks and then

attempted to follow the pattern. This experiment found that separate memory processes are involved in verbal and visuospatial recall indicating that recall is affected by the medium in which the information is presented. A similarly revealing study conducted by Hall and Edmondson (1992) examined the importance of possessing prior information on a subject when taking posttests. The significance of possessing prior information of a subject matter was more evident in delayed posttests indicating that having any amount of prior knowledge of a new subject will enhance long-term memory recall. Participants in memory and recall studies involving information they are somewhat familiar with will provide both higher posttest and delayed posttest scores.

Mayer (1998) has studied if information is integrated more easily when words or instructions are given auditorily, rather than visually. He designed an experiment in which children were given a computer, which showed an animation of how to operate a car or how lightning is formed. Instructions were given about these processes either aurally or visually. The children were tested afterwards and scored based on their ability to recall information about the processes they had previously learned about. Recall performance was significantly greater for those children who saw the computer animation and received aural instruction than those who received visual instructions. This is known as the split-attention effect, where words and pictures can be integrated more easily when the words are presented aurally, rather than visually. Watkins and Peynircioglu (1986) also designed a study that examined visual and auditory effects on recall. Participants were presented with letters or numbers visually or auditorily. They were then asked to recall the list in the order it was presented or in alphabetical order. Auditory recall was found to be better when participants were asked to present the list in serial order and visual recall was found to be better when participants were asked to present the list in alphabetical order. The results of this study suggest that auditory learning results in better short-term memory while visual learning results in better long-term memory. An experiment conducted by Deboth and Dominowski (1978) had similar findings. Participants were presented with a list of twenty words either visually or auditorily. Auditory presentation was found to increase short-term memory recall, but overall there were no conclusive results indicating whether visual or auditory learning resulted in greater memory recall. Another study by Doty and Savakis (1997) examined whether visual and auditory memory recall was focused in different hemispheres of the brain. The study did not find a significant difference in visual verses auditory recall.

Visual memory has been widely studied in recent years, specifically, visual-spatial memory as it relates to verbal working memory. Butcher (2006) conducted an experiment examining the usefulness of text with diagrams in reinforcing mental model development and inference. The study asked

participants to learn about the heart and circulatory system. One group was given text and the other two groups were given text with diagrams of differing complexity. The groups that received diagrams both displayed higher comprehension. The simplest diagram created the greatest amount of comprehension further supporting the effectiveness of visual learning. Visual recall was also found to be greater in a study by Kargopoulos, Bablekou, Gonida, and Kiosseoglou (2003). Participants were divided into two groups and given a description of a person they had no prior knowledge of. One group was given a description with the name of the person in the description and the second group was given a photograph with the description. Both groups were given tests that found that people recalled the information better when it was paired visually with a photograph.

Our study is a logical extension of the pre-existing research and literature. By studying the effect of the type of learning (visual or auditory) over both immediate and delayed posttests, we hope to provide more evidence for the theory that visual stimuli creates better recall both immediately and delayed over auditory stimuli.

## Method

### Participants

Our project involved four groups of college-aged students (49 students total) from a small Christian liberal arts college, specifically Milligan College. Milligan College is home to approximately 903 undergraduate and 197 master's students. There are 664 women and 436 men attending Milligan College, and the population's ethnic mix consists of a white majority (86%), but includes a variety of other races as well, including African American (7%) and Hispanic (3%). 67% of the total student body are below age 24, 24% are between ages 24 and 39, 8% are ages 40-64, and 1% are greater than age 65. All students used in the study were of typical college age (between 18 and 22). Students were already in pre-existing general education classes (two sophomore humanities sections, one sophomore composition class, and one statistics class), and the number of students in each group

ranged from 9 to 16. Classes were chosen randomly.

### **Materials**

We gave each student in two of the groups part of an article about Warren Buffet's childhood to read (see Appendix A for the complete article). The other two groups heard this same part of an article read aloud to them by one of the experimenters. Each student in all 4 groups was then given a twelve-question questionnaire/memory quiz to complete after either reading or hearing the story (see Appendix B for the complete list of questions). The article about Warren Buffet was chosen because it was clear and concise, and it provided the experimenters the opportunity to ask different kinds of memory questions, such as questions about numbers, questions about names, and questions about Buffet's experiences.

### **Design and Procedure**

Our experiment was a 2 (reading versus hearing) X 2 (immediate versus delayed) between groups design. Before participating in the study, each group heard an introduction to the experiment and each person was given an informed consent form to read and sign, with which they could also request further information about the study and its results. After either reading or listening to the article, each student was given an anonymous, short-answer post-test on the article (see attached for the article and the post-test). The first group heard the article read aloud to them, and they took the post-test immediately after hearing the article. The second group heard the article read aloud to them, and they took the post-test 45 minutes after hearing the article. The third group read the article to themselves, and took the post-test 45 minutes after reading the article. The fourth group read the article to themselves, and took the post-test immediately after reading the article. All post-tests were graded by the same experimenter for consistency. The gender of the experimenter (female) was also controlled. A standard protocol was also used for control. Participants were instructed not to disclose information about the study to anyone that did not participate.

## **Results**

A 2 (post-test type: immediate or delayed) x 2 (learning condition: visual or auditory) between-subjects analysis of variance (ANOVA) was performed to assess recall performance. Data analysis revealed a significant main effect of post-test type, such that the immediate post-test for both the visual condition ( $M = 8.00$ ,  $SD = 1.414$ ) and the auditory condition ( $M = 6.44$ ,  $SD = 1.82$ ) outscored the delayed post-test for both the visual condition ( $M = 6.00$ ,  $SD = 2.17$ ) and the auditory condition ( $M = 5.00$ ,  $SD = 1.71$ ),  $F(1, 34.73) = 11.01$ ,  $p = .002$  (see figure 1 in Appendix C). Data analysis also revealed a significant main effect of learning condition type, such that the visual learning condition outperformed the auditory learning condition in both post-test performance settings, where  $F(1, 19.30) = 6.118$ ,  $p = .02$ . However, there were no statistically significant interaction effects present. As predicted, visual learning of the information produced greater memory recall than auditory learning, without regards to the specific test type.

## **Discussion**

We hypothesized that visual learning of information would produce higher test scores in both immediate and delayed post-tests. Our results indicate that overall, visual learning resulted in significantly higher scores in both the immediate and delayed posttest conditions. Thus, our statistical results support part of our hypothesis and give credence to the use of visual learning over auditory learning.

Implications from our research suggest that the use of visual learning mechanisms, rather than auditory learning mechanisms, produces greater learning and memory recall. This indicates that utilizing visual stimuli, rather than auditory stimuli, in the classroom setting will produce better recall performance on exams and quizzes. Our study supports the established literary research that has been conducted up to this point surrounding visual and auditory learning. While it is hard to develop a



solid conclusion regarding styles of learning over all age groups, many studies, including our own, suggest that visual methods of gathering data produce greater recall and performance than auditory methods.

Our study only included college age students, which could limit the effectiveness of these results, due to the fact that younger children's learning strategies are still being shaped. Further research could be developed to study the differences in visual and auditory learning styles in varying age cohorts. Our sample size was also limited due to the availability of participants, but we believe that a broader study would yield the same results. Our use of random assignment, protocol, and consistency of gender of experimenters all helped to reduce extraneous variables and make it more generalizable. The groups may not be representative of the true population of college students because the college we collected our data from is a predominantly white, middle-class college.

In conclusion, our study supports the theory that visual learning leads to greater recall on memory performance tests than auditory learning. While visual learning is not the only method of learning information, it has become, through past research, the most prominent and effective style of information retention. Overall, the use of these findings in the classroom setting could be proven effective through further study and research. Based on our research conclusions, it is our recommendation that college professors and students utilize methods of visual learning to enhance memory recall performance, both inside and outside of the classroom setting.

## References

- Butcher, K. (2006). Learning from text with diagrams: Promoting mental model development and inference generation. *Journal of Educational Psychology*, 98(1), 182-197. Retrieved November 8, 2008, from PsycARTICLES database. doi:10.1037/0022-0663.98.1.182.
- DeBoth, C., & Dominowski, R. (1978). Individual differences in learning: Visual versus auditory presentation. *Journal of Educational Psychology*, 70(4), 498-503. Retrieved November 8, 2008, from PsycARTICLES database. doi:10.1037/0022-0663.70.4.498.
- Doty, R., & Savakis, A. (1997). Commonality of processes underlying visual and verbal recognition memory. *Cognitive Brain Research*, 5(4), 283-294. Retrieved November 8, 2008, from PsycINFO database. doi:10.1016/S0926-6410(97)00005-0.
- Hall, V., & Edmondson, B. (1992). Relative importance of aptitude and prior domain knowledge on immediate and delayed posttests. *Journal of Educational Psychology*, 84(2), 219-223. Retrieved November 8, 2008, from PsycARTICLES database. doi:10.1037/0022-0663.84.2.219.
- Kargopoulos, P., Bablekou, Z., Gonida, E., & Kiosseoglou, G. (2003). Effects of Face and Name Presentation on Memory for Associated Verbal Descriptors. *The American Journal of Psychology*, 116(3), 415-430. Retrieved November 8, 2008, from JSTOR database.
- Mayer, R., & Moreno, R. (1998). A split-attention effect in multimedia learning: Evidence for dual processing systems in working memory. *Journal of Educational Psychology*, 90(2), 312-320. Retrieved November 8, 2008, from PsycARTICLES database. doi:10.1037/0022-0663.90.2.312.
- Pickering, S., Gathercole, S., & Peaker, S. (1998). Verbal and visuospatial short-term memory in children: evidence for common and distinct mechanisms. *Memory & Cognition*, 26(6), 1117-1130. Retrieved November 8, 2008, from PsycINFO database.
- Schroder, A. (2008). How Warren Buffett made his first dime [Electronic version]. *Parade Magazine*. Retrieved November 10, 2008, from <http://www.parade.com>
- Watkins, M.J. & Peynircioğlu, Z.F. (1983). Interaction between presentation modality and recall order in memory span. *The American Journal of Psychology*, 96(3), 315-322. Retrieved November 8, 2008, from JSTOR database.

## Appendix A

### How Warren Buffett Made His First Dime

The first few cents Warren Buffett earned came from selling chewing gum. And from the day he started selling--at 6 years of age--he showed an unyielding attitude toward his customers that revealed his later style. "I remember a woman saying, 'I'll take one stick of Juicy Fruit,'" he says. "I said, 'We don't break up packs of gum'--I mean, I've got my principles." Making a sale was tempting, but not tempting enough. If he sold one stick to her, he'd have four sticks left to sell, not worth the work or the risk. He made two cents profit per pack.

Warren switched to selling Coca-Cola--he made a nickel for every six bottles--and copies of the Saturday Evening Post and Liberty magazines. By the time he was 9 or 10, he and a pal were selling used golf balls until the cops stopped them. When the police talked to his parents, Howard and Leila weren't concerned. They just considered their son ambitious.

For Warren's 10th birthday, Howard took him to New York. A scene from the stock exchange dining room captured his imagination. "We had lunch with At Mol, a member of the stock exchange. After lunch, a guy came along with a tray that had all these different kinds of tobacco leaves on it. He made up a cigar for Mr. Mol, who picked out the leaves that he wanted. I thought: It doesn't get any better than this." Warren had zero interest in smoking a cigar, but he saw what hiring a man for such a frivolous purpose implied. It meant that, even while most of the country was still mired in the Depression, the cigar man's employer--the stock exchange--was making a great deal of money. That day, a vision of his future was planted. He wanted money. "It could make me independent. Then I could do what I wanted to do with my life. And the biggest thing I wanted to do was work for myself."

## Appendix B

### Warren Buffett Article Questions

1. What is the first item Buffett sold?

---

2. How much did he sell the first item for?

---

3. What is the second item Buffett sold?

---

4. How much did he sell the second item for?

---

5. What two magazines did Buffett sell as a child?

---

6. What did Buffett say was the biggest thing he wanted to do for himself?

---

7. What incident sparked Buffett's desire to be rich?

---

8. What is Buffett's father's name?

---

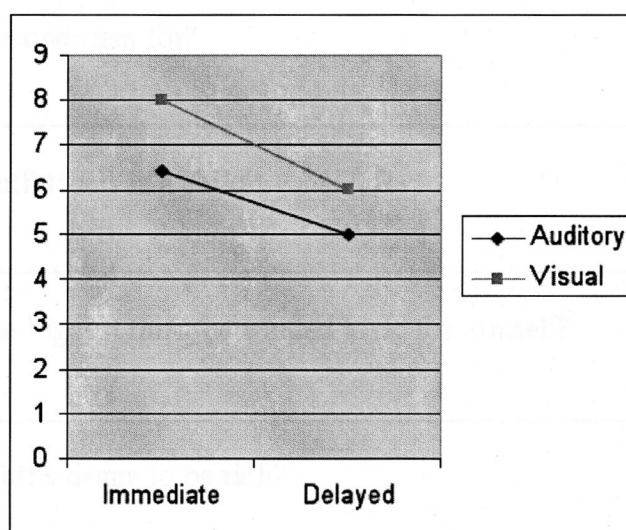
9. What is Buffett's mother's name?

---

10. What did Buffett's parents say when he was brought home by the police?

---

### Appendix C



*Figure C1.* Graph of ANOVA showing the mean auditory and visual scores from both the immediate and delayed condition.